International Journal of Academic Information Systems Research (IJAISR)
ISSN: 2000-002X
Vol. 2 Issue 9, September – 2018, Pages: 29-38

The Impact of Technological and Human Requirements for Re-Engineering Processes in Improving Productivity

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Abstract: *This study aimed at measuring the effect of the technological and human requirements for re-engineering the processes in improving productivity in the Palestinian industrial companies. The researchers used the descriptive analytical method. The study society is composed of all the Palestinian industrial companies (wood, plastic, aluminum, metal) operating in Gaza Strip and registered in the Federation of Palestinian Industries was (236). The sample of the study was selected using the stratified random sampling method. The sample size was 95 companies with 40% of the size of the society. The recovered and valid questionnaires were 85 by (89.5%), An exploratory sample of (30) companies from the sample of the study. The statistical analysis was conducted to verify the validity and consistency of the questionnaire.*

The results of the study were: High availability for the requirements of process engineering in the Palestinian industrial companies. The technological order was 76.8%, the human requirements were 75.8%, the productivity level was 76.4% Technology and human re-engineering processes in improving productivity. (44.4%) while the rest in improving productivity was due to other factors.

The study presented a number of recommendations, the most important of which is the need for Palestinian industrial companies to adopt many concepts that reflect the dimensions of the process reengineering approach, focusing on developing values that reflect the importance of human resources and information technology. And to work to provide prizes to the outstanding employees of the company, and praise their efforts and encourage them to make more efforts and provide innovations for the success of the work. And carry out periodic studies to identify changes and developments in the Palestinian industrial environment, and work to keep pace with those changes.

Keywords: Technological Requirements, Human Requirements, Process Reengineering, Productivity Improvement, Palestinian Industrial Companies, Gaza Strip, Palestine

1. INTRODUCTION

The latest developments in contemporary administrative thought is the production of new concepts and practices for the management of organizations. The process reengineering approach is one of the most prominent. It is considered a new management concept for all organizations. This approach has achieved the objectives of senior management. Of organizations wishing to achieve their objectives.

One of the most important requirements of process reengineering is technology requirements and human requirements, as technology requirements make companies keep pace with developments and changes in technology and thus allow companies to face competition through the use of the latest methods of work and production and the availability of large-scale production opportunities, thus reducing costs.

While human requirements are the requirements that provide the company with the expertise and capabilities that enable it to work efficiently and effectively. Human capital is the most important asset in the company, and the presence of a human cadre trained and has great expertise contributes to improving the performance of companies and their productivity.

Although many researchers have been interested in studying process reengineering, a few studies have examined the requirements of the process reengineering approach in industrial companies in particular and their role in developing these companies. Based on the above, this study is one of the few studies aimed at answering the following main question: "The impact of the technological and human requirements for the re-engineering processes on improving the productivity of the Palestinian industrial companies operating in the governorates of the Gaza Strip".

1. What is the level of availability of technological and human requirements for the re-engineering of operations in the Palestinian industrial companies operating in the Gaza Strip governorates?
2. What is the level of productivity in the Palestinian industrial companies operating in the Gaza Strip?
3. Is there an impact on the technological requirements of process reengineering to improve productivity in Palestinian industrial enterprises?
4. Is there an impact of human re-engineering requirements on improving productivity in Palestinian industrial enterprises?

2. RESEARCH OBJECTIVES

1. Contribute to the level of availability of technological requirements for the re-engineering of operations in Palestinian industrial companies.
2. Know the level of availability of human requirements for re-engineering operations in Palestinian industrial companies.
3. Identify the level of productivity in the Palestinian industrial companies.
4. Detect the impact of technological requirements on improving productivity in Palestinian industrial companies.
5. Contribute to the detection of the impact of human requirements on improving productivity in Palestinian industrial companies.

3. RESEARCH IMPORTANCE

1. To provide the General Federation of Palestinian Industries with the availability of technological and human requirements for the re-engineering of operations in Palestinian industrial companies.
2. Provide documented recommendations and proposals from the field study that will help Palestinian industrial companies implement the process reengineering approach.
3. This study may contribute to drawing the attention of researchers to undertake many studies and researches in modern administrative curricula and apply them to vital sectors such as the industrial sector.
4. The lack of adequate field studies focused on detecting the impact of technological and human requirements on process reengineering in particular improving productivity.

4. RESEARCH LIMITS AND SCOPE

1. **Objective limitation**: The study was limited to identifying the impact of technological and human requirements for re-engineering processes in improving productivity in the Palestinian industrial companies operating in the Gaza Strip governorates.
2. **Spatial space**: The study was limited to the sector of wood, plastic, aluminum and metal industries operating in the governorates of the Gaza Strip.
3. **Human limitation**: Data were collected from the representatives of the companies under study.
4. **Time limitation**: Data for this study were collected during the year (2016/2017).

5. THEORETICAL FRAMEWORK

The requirements of the process reengineering approach: Given the diversity of the views of the authors and researchers in defining the requirements of the process reengineering approach, there is agreement on a range of dimensions. The study (Goksoy et al., 2012) and the study (Ringim et al., 2012), (Yahaya et al., 2012) noted that technological requirements are one of the pillars of the process reengineering approach, as well as the study (Qawie, 2009) and the study (Aga, 2006) which concluded that the human resource is one of the most important requirements for the success of this approach. (Ibrahim and FarajAllah, 2017) and the study (Deep, 2009) that the requirements for implementing the process reengineering approach are technological and human.

First - Technological Requirements

Information technology is one of the strongest strengths to implement a process reengineering approach, with IT contributing significantly to making tasks easier, redesigning institutions, changing work methods, and delivering dramatic and exciting improvements (Attaran, 2004) highlighted the importance of IT integration to the process reengineering methodology as an energy source that enables continuous improvement and achievement of goals as quickly as possible, by facilitating task performance and drastic changes to completed work. Bujoreanu (2005) believes that information technology plays a role in achieving managerial development and developing organizations through information that facilitates administrative work. Progress in computer and software systems facilitates the storage, processing and processing of data to suit the needs of the work environment and the needs of individuals.

Second- Human Requirements

If it is assumed that process reengineering will change the method or way of doing business, it necessarily means that human resources will be directly affected when this new philosophy is built, so the human resource is one of the most important requirements of that approach (Qawie, 2009). Al-Maayta (2010) points out that success and qualitative transformation in the organization depend on human resources through their knowledge, creativity and ability to open to change. New skills can be built for individuals only through training, education, accepting challenges in work, New work, delegation of authorities where human resources are available to take responsibility for doing business, stimulate creativity, give a sense of achievement and increase productivity.

6. RESEARCH HYPOTHESIS

To achieve the objective of the study, a number of studies and previous research were examined on the subject of the study, and then linked to the relationships between the variables of the study and therefore for the development and conclusion of the hypotheses.

1. The relationship between technological requirements for process re-engineering and productivity Qawie (2009) points out that information technology is one of the pillars and prerequisites to ensure the successful implementation of the process reengineering approach. Al-Otaibi and Al-Hamali (2004) One of the modern development approaches that aims to reach ambitious

improvement results in modern performance measures: improving service, increasing productivity, speed of work completion. Hence, the first main hypothesis can be deduced: There is a statistically significant effect at ($\alpha \leq 0.05$) for the technological requirements of the reengineering approach on productivity in the Palestinian industrial companies operating in Gaza Strip.

2. The relationship between human requirements for re-engineering process and productivity: Ibrahim and FarajAllah (2017) indicated a statistically significant impact of human re-engineering requirements on product quality, as well as Deep (2009), which indicated that qualified human resources when applying the process reengineering approach contribute to the achievement of competitive advantage. Hence the second main hypothesis can be deduced: There is a statistically significant effect at the level ($\alpha \leq 0.05$) to the human requirements of the re-engineering process methodology on productivity in the Palestinian industrial companies operating in the governorates of Gaza Strip.

Methodology of the study:

Study Methodology: The study was based on the descriptive approach in covering the requirements of the theoretical framework and presenting the previous studies, as well as conducting the desk survey on the theoretical theses concerning the variables and dimensions of the study.

Study Society: The study population consists of all the Palestinian industrial companies registered with the Federation of Palestinian Industries (wood, plastic, aluminum, metal) and operating in the Gaza Strip, which reached (236) companies.

Sample of the study: The sample of the study was selected using the stratification method as one of the statistical methods used to be representative of the study society in accordance with the rules of scientific research in the selection of samples. The sample size was 95 companies. Table (1) shows the number of distributed, a sample of 30 companies was selected from within the study sample. Statistical analysis was conducted to verify the validity and consistency of the questionnaire.

Table 1: Distributed and validated questionnaires valid for analysis

No.	Industrial Sector	Number of Distributed Questionnaires	Number of Valid Questionnaires For Analysis	Percentage %
1.	Wood Industries	29	27	93.1 %
2.	Plastic Industries	30	26	86.6 %
3.	Aluminum Industries	14	11	78.5 %
4.	Metal Industries	22	21	95.5 %
Total		95	85	89.5 %

Source: Prepared by researchers based on statistical analysis data

Study tool:

To achieve the objective of the study, the present study was used as a study tool in the collection of data related to the subject of the study, which was prepared and developed based on the theoretical literature on the process re-engineering and productivity approach, as well as the questionnaires related to the subject of technological and human requirements for reengineering operations And their impact on productivity in the Palestinian industrial companies, taking into account that the paragraphs are proportional to the study environment. The first part of the tool concerned the identification of the technological and human requirements for the re-engineering of operations in the Palestinian industrial companies. The technological requirements sections were developed under the guidance of (Al-Aga, 2006), which was finalized in (6) paragraphs. The second part is the questionnaire of productivity in the Palestinian industrial companies, which was prepared under the guidance of (Al-Smadi and Al-Jawzah, 2011) and was formed in its final form with (4) paragraphs. The questionnaire was presented to a group of arbitrators who are specialized in Palestinian universities to guide their opinions on the appropriateness of the paragraphs of the questionnaire for their purpose, as well as to verify the correctness and clarity of the language.

7. Statistical Processes:

The researcher used the Statistical Package for Social Sciences (SPSS) to perform the necessary statistical treatments. The following treatments were used:

1. Descriptive statistical measures: percentages and arithmetic mean.
2. Cronbach's Alpha test to determine the stability of the resolution paragraphs.
3. Kolmogorov–Smirnov test: This test is used to determine whether the data follow natural distribution or not.
4. Factor Analysis test, which collects one-variable variables in a homogeneous structure internally linked to one another in a form called a factor.
5. T-test in the case of a single T-Test: To determine whether the average response has reached the neutral level (60%) or increased or decreased, and has been used to ascertain the mean significance of each area of the questionnaire.
6. VIF and Tolerance test to ensure that there is no high correlation between the independent variables.

7. Multiple Regression Analysis: To test the validity of the model and the effect of the independent variable on the child.

Validation of the study tool: The validity of the questionnaire is intended to measure the questions of the questionnaire, and the validity of the analysis is used to verify its validity.

Factor Analysis

Factor analysis was used to collect one-nature variables in a homogenous structure interrelated internally in a composition called a factor so that each of these variables is related to this factor. In this study all variables were subjected to global analysis The basic component and Varimax methods were used to determine the loading factors and Amin (2008) identified the need for a set of conditions to accept the results of the data analysis as follows: The value of the scale (KMO) to test KVA The size of the sample taken in the interpretation of the phenomenon studied and less value to the adequacy of the acceptance of the results of the analysis are (0.6). Bartlett is an indicator of the relationship between variables. Its value must be a function at a significant level less than 0.05. In addition, the factor loading should not be less than (0.5), taking into account the absence of cross values of (0.5) in other factors.

1. Analysis of independent variables (technological and human requirements)

The results show that the value of the KMO is equal to 0.835. This indicates an increase in the reliability of the factors we will obtain from the global analysis. We also judge the sample size. The probability value of the Bartlett test is 0.000 which is less than 0.01. This means that the correlation matrix is not equal to the unit matrix, and that the values of the communalities were greater than (0.5) for all the paragraphs. Two factors were extracted, which accounted for 70.9% of the total variance. Phrases have been omitted for non-saturation conditions, taking into account the absence of cross-values in excess of (0.5) in other factors.

Table 2: Results of the analysis of independent variables (technological and human requirements)

No.	Item	Factor 1	Factor 2
1.	The company has good knowledge of technological developments appropriate to the company's objectives	0.852	0.235
2.	The company is characterized by its high level of technological developments in the surrounding environment	0.805	0.189
3.	The company coordinates its internal operations using IT	0.873	0.160
4.	The company relies on information technology in its control operations	0.800	0.244
5.	The company uses IT to redesign its operations	0.810	0.243
6.	The company engages its employees in IT-related training courses	0.834	0.188
7.	The company has qualified management competencies to lead the company's change team	0.057	0.867
8.	Employees at the company have a positive outlook for the success of the change in the company	0.309	0.748
9.	The company can maneuver the workers to work on most of the equipment and machines of the company	0.161	0.813
10.	The company has human resources that have the ability to deal with IT	0.266	0.778
11.	The company is working to put the right person in the right place	0.194	0.763
12.	The company helps to develop administrative leadership to understand and apply modern administrative thought	0.297	0.796
Total Variance Explained		70.9 %	
Kaiser-Meyer-Olkin Test		83.5 %	
Bartlett Test Sig.		0.00	

2. Analysis of the dependent variable (productivity)

The results show that the value of the "KMO" is equal to 0.804. This indicates an increase in the reliability of the factors that will be obtained from the global analysis, as well as the size of the sample.

Table 3: Results of the analysis of the dependent variable (productivity)

No.	Item	Factor 1
1.	The company uses control methods that optimize the use of resources	0.811
2.	The company disposes of some activities that do not have a competitive advantage	0.789
3.	The company sets a plan for the levels of productivity to be reached	0.840
4.	The company provides advanced production equipment	0.822
Total Variance Explained		66.5 %
Kaiser-Meyer-Olkin Test		80.4 %
Bartlett Test Sig.		0.00

The probability value of the Bartlett test is 0.000. This means that the correlation matrix is not equal to the unit matrix, and that the values of the communalities are greater than 0.5 for all the paragraphs. One factor was extracted, which accounts for 66.5% of the total variance. Phrases have been omitted for non-saturation conditions, taking into account the absence of cross-values in excess of (0.5) in other factors.

Stability of the study instrument: The Cronbach's Alpha Coefficient was used to verify the stability of the questionnaire and to calculate the stability of each area of the questionnaire separately. The stability coefficients (88.4), (82.7), (70.8) for the areas of regulatory, human, and productivity requirements, which indicates that the instrument of study has a high degree of consistency so that it can be relied upon to measure what is designed for it.

Table 4: Determination of Determination of Determination of Determination by Cronbach's Alpha

No.	Dimension	No. Of Items	Cronbach's Alpha
1.	Technological Requirements	6	88.4
2.	Human Requirements	6	82.7
3.	Productivity	4	70.8

Natural distribution test (Kolmogorov–Smirnov test)

The researchers used the Kolmogorov–Smirnov test to determine whether the data follow normal distribution, a necessary test in the case of hypothesis testing, because most laboratory tests require that the data be distributed naturally. The following table shows (5) the results of the test where it was found that the value of the level of significance for each field is greater than 0.05 (sig.> 0.05). This indicates that the data follow normal distribution and the scientific tests should be used.

Table 5: Natural distribution test (1- Sample K-S) for all fields

No.	Dimension	Sig.
1.	Technological Requirements	0.052
2.	Human Requirements	0.837
3.	Productivity	0.665

Answer of the study questions and test hypotheses:

Answer of the study questions

The main Dimension of the study were analyzed by calculating the arithmetical averages, percentages and T test of the sample per Dimension.

Table 6: Results of analysis of study variables

No.	Dimension	Mean	S. D.	T – Test	Sig.	%
1.	Technological Requirements	3.84	0.71	10.97	0.00	76.9
2.	Human Requirements	3.79	0.73	9.92	0.00	75.8
3.	Productivity	3.82	0.75	10.11	0.00	76.4

It is clear from the above table that the level of availability of technological requirements for process reengineering was very high, with an arithmetic average of 3.84 and a percentage of 76.9%. The standard deviation indicates that the response of the respondents was not significantly different and was close to the arithmetic mean, (3.71) and a percentage of 75.8%. The standard deviation indicates that the respondents' responses were not significantly different and were close to their arithmetic mean. Standard deviation (0.73). Finally, the results showed that the level of productivity in the industrial companies studied was very high. The mean was 3.82 and 76.4%. The standard deviation indicates that the respondents' responses were not significantly different and were close to their arithmetic mean where the standard deviation was 0.75.

8. TEST HYPOTHESIS OF THE STUDY:

In order to test the hypothesis of the study (I and II) on the detection of the effect of technological and human requirements on process re-engineering on productivity improvement, a multiple regression analysis was made. The Beta coefficient was used to determine the expected change in the dependent variable due to the change in one unit of the variable Independent. R^2 was also used to identify the model's ability to interpret the relationship between independent and dependent variables, as well as to use the F-test to identify the significance of the regression model. The significance level (0.05) was used to judge the significance of the effect.

However, before the application of multiple regression analysis to test the hypotheses of the study, some tests were carried out in order to ensure the adequacy of the data for the regression analysis assumptions as follows: In relation to the necessity of the absence of multiple linear correlation between the independent variables "Multi- Collinearity" (Variance Inflation Factor - VIF), Tolerance Test for independent variables. The data inflation factor of the variable must not exceed 10 and the permissible variance value is greater than 0.05 so that we can perform the regression analysis without any problems, The results indicate that the value of the inflation factor The variation of (1.306) which is less than (10 value) and that the value of the permitted variation of (0.766) which is greater than (0.05) value, which indicates the absence of problems related to the existence of a high correlation between independent variables.

The results shown in Table (7) revealed that the value of (F) for the full model was 34.51 and the probability value (0.000) which is statistically significant at α= 0.05 indicating the significance of the model as a whole. (44.4%), indicating that 44.4% of the improvement in productivity is due to the independent variables (technological and human requirements for process re-engineering) and the rest is due to other variables that affect productivity, the correlation coefficient of the model was 0.676, indicating a strong positive relationship.

Table 7: Result of the hypothesis (first, second) test

Dimension	Productivity		
	Beta	T- Test	Sig.
Constant	0.739	1.956	0.054
Technological Requirements	0.360	3.676	0.000
Human Requirements	0.448	4.741	0.000
R	0.676		
R Square	0.457		
Adjusted R Square	0.444		
F Change	34.51		
Sig. F Change	0.000		

The table above shows that the result of the first hypothesis was as follows: Beta (0.360), T-Test (3.676) and statistical significance (0.00), which is statistically significant at (0.05). The first main hypothesis can be accepted: "There is a statistically significant impact at the level of (α≤0.05) of the technological requirements of process re-engineering on productivity improvement in Palestinian companies in the Gaza Strip." The researchers attributed this to the conviction of the senior management and its coping with the technological developments that serve the objectives of the company and its work to provide the companies with modern machines and equipment used in the production processes, which contributes to improving the mechanism of work and raising performance levels, which in turn reflects on productivity and increases it.

This finding is in line with the findings of (Ibrahim and FarajAllah, 2017), which indicated a statistically significant impact on technological requirements and product quality, as well as the study of (Al-'Alawi, 2013), which indicated the impact of technological re-engineering requirements on improving performance and productivity , And is consistent with the study (AL-jerba, 2011) which indicated that there is an impact of the high technological capabilities used in reengineering operations on organizational effectiveness.

The results of the second hypothesis were as follows: Beta (0.448), T-Test (4.741) and statistical significance (0.00), which is a statistically significant value at (α≤ 0.05. The second main hypothesis is that: "There is a statistically significant effect at the level of significance of (α≤ 0.05 for the human requirements of reengineering operations to improve productivity in Palestinian companies in the Gaza Strip." The researchers argue that the availability of these requirements is the real determinant of productivity, Thus productivity can be improved by linking individuals, resources, rules and procedures together As well as increasing the efficiency of decision-making processes, while improving staff performance by increasing their ability to work by providing individuals with knowledge, knowledge, experience and training, all of which have a supportive role for human resources to improve productivity. The results of the study (Ibrahim and FarajAllah, 2017), which indicated the existence of a statistically significant impact on human requirements and product quality, as well as the study (Al-Otaibi and Al-Hamali, 2004), which indicated that the human resource is considered as a key element in the implementation of re-engineering processes, Positive to hide Costs, which in turn works to improve productivity.

In general, these findings are consistent with the findings of the study (Setegn, et al., 2013). There is a strong positive relationship between the application of the process reengineering approach and the significant improvements in the speed of service delivery, cost, quality, efficiency and productivity, as well as the study of (Shibli and Ali, 2012) and (Al-Otaibi and Al-Hamali, 2004), which indicated that there is a positive impact on the performance of the re-engineering process on the performance of the company.

9. RESULTS

The results of the study indicated several results, the most important of which are:

1. A high level of technology requirements for the re-engineering of operations in Palestinian industrial companies
2. A high level of human requirements for the re-engineering of operations in Palestinian industrial companies
3. There is a high level of productivity in the Palestinian industrial companies
4. There is a statistically significant impact of technological and human requirements on improving productivity in Palestinian industrial enterprises
5. The results indicate that 44.4% of the improvement in productivity in industrial companies is due to the technological and human requirements, while the rest is due to other factors.

10. RECOMMENDATIONS

Based on the above results, the study recommended:

1. Palestinian industrial companies should adopt many concepts that reflect the dimensions of the process reengineering approach by focusing on developing values that reflect the importance of human resources and information technology because they have a significant impact on the success of the process reengineering approach.
2. The need to work to provide prizes to outstanding employees in the company, and praise their efforts and encourage them to make more efforts and provide innovations for the success of the work.
3. The need to conduct periodic studies to identify changes and developments in the Palestinian industry environment, and to work to keep pace with those changes.
4. The need for similar studies that cover the requirements of re-engineering of other processes such as (organizational requirements, material requirements, strategic planning, human resource efficiency).

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